



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 5, May 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com

Design and Development of Ventilation System For Optimum Performance Using Solar Power

Ghorpade Vaibhav, Karale Sanket, Patil Sudarshan, Thombare Priyanka

UG Students, Dept. of Mechanical Engineering., PREC, SPPU University, Maharashtra , India

Assistant Professor, Dept. of Mechanical Engineering., PREC, SPPU University, Maharashtra , India

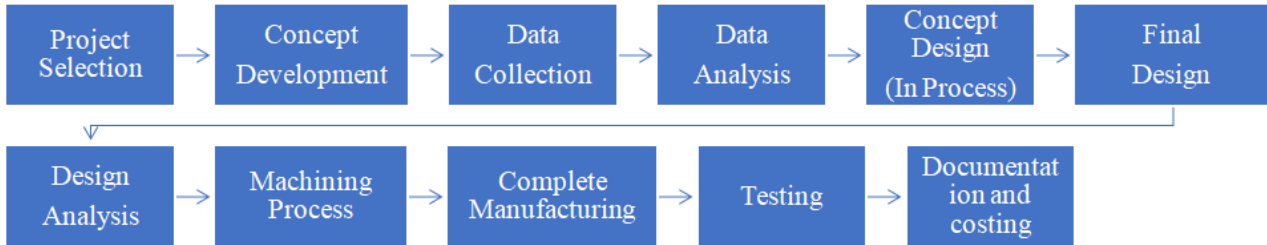
ABSTRACT: Currently, ambient temperatures are progressively increasing. This rise in temperature poses a challenge in industrial sheds, where adequate ventilation is crucial. To address this issue, turbo ventilators are employed as part of the ventilation system in industrial settings. Turbo ventilators function based on the density difference of air. However, for optimal ventilation, it is necessary to enhance the speed of the turbo ventilator. This can be achieved by incorporating a drive mechanism powered by solar energy. The proposed project aims to develop a solar-powered turbo ventilator with high efficiency.

The issue of electricity scarcity is prevalent in many countries, including India. Solar energy, being a renewable and non-polluting source, has gained significant technological advancements for electricity generation. Therefore, there is a growing emphasis on harnessing solar energy for power generation.

KEYWORDS : Solar energy,Electricity,Ventilator

I.INTRODUCTION

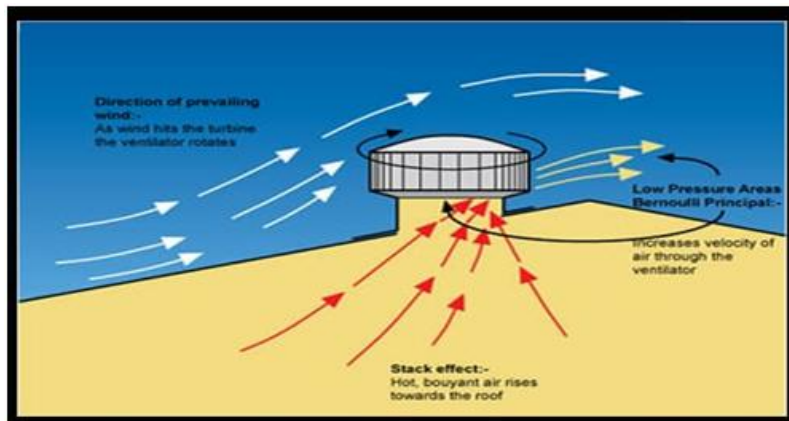
Nowadays, global warming has become a significant issue, leading to increased thermal conditions worldwide. This warming effect extends to cars parked in exposed areas without any shield, resulting in several issues. The elevated temperatures create an uncomfortable environment for both the driver and passengers, increase fuel consumption, and may even lead to heat strokes. To address these challenges, it is essential to develop a ventilation system that can stabilize the temperature inside the car, thereby providing a comfortable environment for users. While solar energy is an unlimited resource, certain obstacles can hinder its potential. For instance, solar panels need direct exposure to sunlight to maximize electricity conversion rates. Cloudy days, shading, and shadows can decrease their ability to produce power supply. Users generally prefer solutions that are convenient and not burdensome. If the ventilation system requires manual handling, it can pose difficulties for users. For instance, installation may take more time, impacting users who are in a hurry. Proper ventilation is crucial in any industry to ensure a safe, efficient, effective, and healthy working environment for humans. Ventilation involves the removal of stale hot air and the provision of fresh cool air. It helps balance temperatures, supplements oxygen levels, and eliminates harmful substances such as moisture, dust, smoke, heat, flying bacteria, and carbon dioxide. Turbo ventilators are an ideal solution as they operate on natural wind energy, making them cost-effective in terms of operation and maintenance. Additionally, these systems are environmentally friendly as they do not consume any external power. Turbo ventilators, which do not require external power, are an excellent option for ventilating buildings. The concept of turbo ventilators was originally patented by Meadows.



Ventilation system is the mechanical system in a building that brings in Fresh outdoor air and removes the contaminated indoor air. In a workplace, ventilation is used to control exposure to airborne contaminants. In this project we can use solar energy to rotate the turbo-ventilator and reduce the temperature of industrial shade in low cost

II.MATERIAL SELECTION

Sr. No.	Components
1.	Turbo ventilator
2.	Solar power plate
3.	12V Battery
4.	Temperature Controller
5.	12V DC Motor



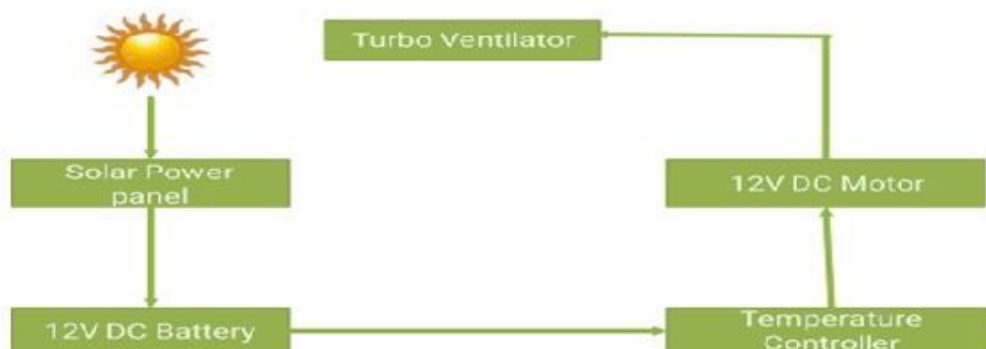
The ventilator is combination of both natural and forced ventilation system. It functions as a natural ventilator when there is a difference in thermal or wind pressure between the inside and outside of the building which forces the air to move through the opening of the ventilator. Industrial activity generates heat and hot air being lighter moves upwards. In this project we can do this process faster than natural system by new implementation using 12V DC motor which works on 12V DC battery.

When solar power plate convert solar energy into electrical energy. Then we can charge the 12V battery by using this electrical energy. Input wire of Temperature controller is connected to 12V battery and output wire of temperature controller is connected to 12V DC motor. Temperature sensor sense the temperature of industry shade which is connected to temperature controller. When temperature rise above as we set the temperature in temperature controller according to comfort of workers, industrial equipment and products then circuit is completed from battery to 12V DC motor and then 12V DC motor run and rotate the turbo ventilator by using gear.

When turbo ventilator rotates the centrifugal force caused by the spinning vanes creates a region of low pressure area which draws air out through the turbine and temperature in the industrial shade will be decreases and then when we achieve temperature less than as we set in the temperature controller and then 12V DC motor stop their working whenever again temperature not rise above the set temperature.

A DC motor or direct current motor is an electrical machine that transforms electrical energy into mechanical energy by creating a magnetic field that is powered by direct current. When a DC motor is powered, a magnetic field is created in its stator. The field attracts and repels magnets on the rotor; this causes the rotor to rotate. To keep the rotor continually rotating, the commutator that is attached to brushes connected to the power source supply current to the motors wire windings.

One of the reasons DC motors are preferred over other types of motors is their ability to precision control their speed, which is a necessity for industrial machinery. DC motors are able to immediately start, stop, and reverse—an essential factor for controlling the operation of production equipment.



III.CONCLUSION AND FUTURE WORK

The design and development of a ventilation system for optimum performance using solar power offer numerous benefits and solutions. The project aimed to address the issue of uncomfortable environments in parked cars due to increasing temperatures and to provide a comfortable atmosphere for users. By harnessing solar energy through solar panels and utilizing a 12V DC motor powered by a 12V battery, the ventilation system successfully achieved its objectives.

The combination of natural and forced ventilation methods allowed for efficient air circulation and temperature control within industrial settings. The implementation of a temperature controller and sensor ensured that the ventilation system operated according to the desired comfort level for workers, industrial equipment, and products. By setting the temperature threshold in the temperature controller, the system could automatically activate when the temperature exceeded the set limit and deactivate when the desired temperature was reached.

The utilization of solar power as an energy source made the ventilation system cost-effective and environmentally friendly. Solar panels converted solar energy into electrical energy, which was used to charge the 12V battery. This approach eliminated the need for external power sources, reducing operational costs and minimizing the system's carbon footprint.

The incorporation of a 12V DC motor facilitated precise speed control, enabling efficient operation and immediate start, stop, and reverse functionalities. This level of control is crucial for industrial machinery and ensures optimal performance and productivity.

Overall, the design and development of the ventilation system demonstrated the effectiveness of utilizing solar power for temperature regulation and comfort enhancement. The project's success highlights the potential for sustainable and energy-efficient solutions in various applications, offering benefits such as reduced fuel consumption, improved working conditions, and minimized environmental impact.

Moving forward, further research and development can focus on optimizing the system's efficiency, exploring additional features, and enhancing user-friendliness. Continued advancements in solar technology and motor control systems will undoubtedly contribute to the evolution of ventilation systems, providing even more effective and sustainable solutions for temperature regulation and air circulation in various environments.

REFERENCES.

1. MR. GANESH K. JADHAV, DR. P. M. GHANEGAONKAR "PERFORMANCE CHARACTERISTICS OF TURBO VENTILATOR"- 2276-2282 (2015)
2. DOVYDASRIMDŽIUS, JUOZASBIELSKUS, VYTAUTASMARTINAITIS, VIOLETA MOTUZIENĖ, AND GIEDRĖSTRECKIENĖ, "EXPERIMENTAL EVALUATION OF TURBINE VENTILATORS PERFORMANCE UNDER DIFFERENT TEST CONDITIONS"- (2018)
3. MANSI JOSHI, SUHASCHOU DHARI, "TURBO AIR VENTILATOR USED IN NATURAL VENTILATION"- (2018)
4. ABHILASH G, AJAY H. R., HARISH R., "DESIGN AND FABRICATION OF HYBRID EXHAUST VENTILATOR TURBINE AND SOLAR TRACKING MECHANISM USING RTC"- (2020)
5. MS. NEHA S. CHOURASIA, MR. SHUBHAM MOON, MR. DIPESH TAWLARE, MS. MAMTA BAGDE, MR. RITESHTELANG, MR. ABHISHEK GHARDE, "SOLAR OPERATED DC MOTOR FOR MIXER GRINDER WITH AUTO CHARGING"- (2021)
6. TI WAI CHAN, UMAR NIRMAL, "DESIGN AND FABRICATION OF A SOLAR POWERED ROOF EXHAUST FAN"- (2015)
7. MOHD FAIRUS ABDOLLAH, MOHD KHAIRI, "DEVELOP AND IMPLEMENTATION OF SOLAR POWERED VENTILATION SYSTEM"- (2018)



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.423



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 ijirset@gmail.com



www.ijirset.com

Scan to save the contact details